Archaeological Discoveries on the Mackenzie Highway

by

B.C. Gordon

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Archaeological discoveries on th

19th Century Trading Post

Events leading to the 1967 investigations of Fort Alexander began at the modern trading settlement of Fort Liard through Father Posset, O.M.I. who informed my wife and I that a "number of mounds and depressions" had been observed along the trapline of George Boots, a resident of Willowlake River settlement. On the north bank of this river several miles upstream from the settlement a series of mounds and depressions covered with earth and vegetation had been observed by Boots and his father (then 79 years of age) for a period spanning half a century (Fig 1). Heightened curiosity plus a penchant for digging in a new area of the Northwest Territories suggested further examination. Arriving August 8th at Fort Simpson via Northern Mountain Airways Beaver piloted by Lester Bower, we were able to secure a ride to Willowlake River with the R.C.M.P.

On August 11th Boots pinpointed the mounds and depressions adjacent to a poplar grove midway between his trapline and the river. Full scale excavation was initiated the following day.

We spent a week testing three mounds and six depressions on the north bank of the Willowlake River 2.5 km from its confluence with the Mackenzie River. The mounds were the remains of collapsed cobblestone chimneys while the depressions were cabin basements and refuse pits of historic Fort Alexander. Based upon structural remains one large cabin with fireplaces and smaller cabins, one unheated, possibly for storage purposes, were found. The double fireplace, room division, size (18 by 33 ft.), and proximity to the river suggest the large cabin was the fort's living quarters.

Most material found at Fort Alexander came from the large cabin and included metal, clay and butchered bone. Metal artifacts included a wrought iron hinge and fastener and square nails, all present in the early 19th century. Clay wall chinking and chimney pipe support were found. A minimum date for Fort Alexander was 1863, based upon a dendrochronological sample producing 104 tree rings and the oral record among the modern area inhabitants. Clarification via archival records indicate that Fort Alexander was occupied by the North West Company in 1817-1821 after its builder, Charles Grant, established it as a wintering fort.

Future excavation, preferably this summer, is necessary for a complete explanation of the operations, architecture and possible reconstruction of this early 19th century North West Company fur trading post. The proximity of the proposed Mackenzie Valley highway, and gas and oil pipelines near if not over this site, makes it mandatory that it be excavated without delay. A Department of Public Works road construction camp at the fort's boundary poses no direct threat. Nonetheless, future activity at this area will doubtless increase. Hopefully, construction engineers and archaeologists will collaborate in preserving the first historic fort to be excavated in the Northwest Territories, and that another important portion of Canadiana will not fall to the bulldozer's blade.

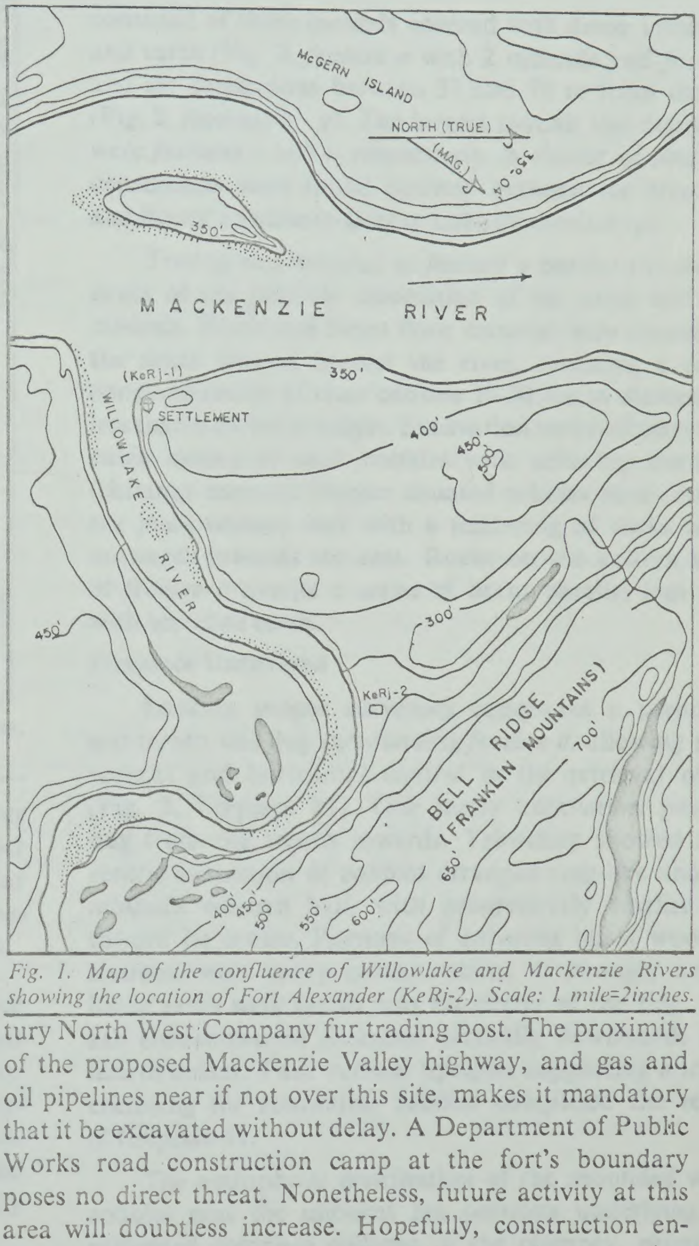

Fig. 1. Map of the confluence of Willowlake and Mackenzie Rivers showing the location of Fort Alexander (KeRj-2). Scale: 1 mile=2inches.

Location

Fort Alexander, (KeRj-2,) is situated 2.5 km upstream from the confluence of the Willowlake and Mackenzie Rivers (Fig. 1), just off the trapline of George Boots. The area is hilly with elevations in excess of 220 m away from the rivers, dipping abruptly to sandy and swampy low-

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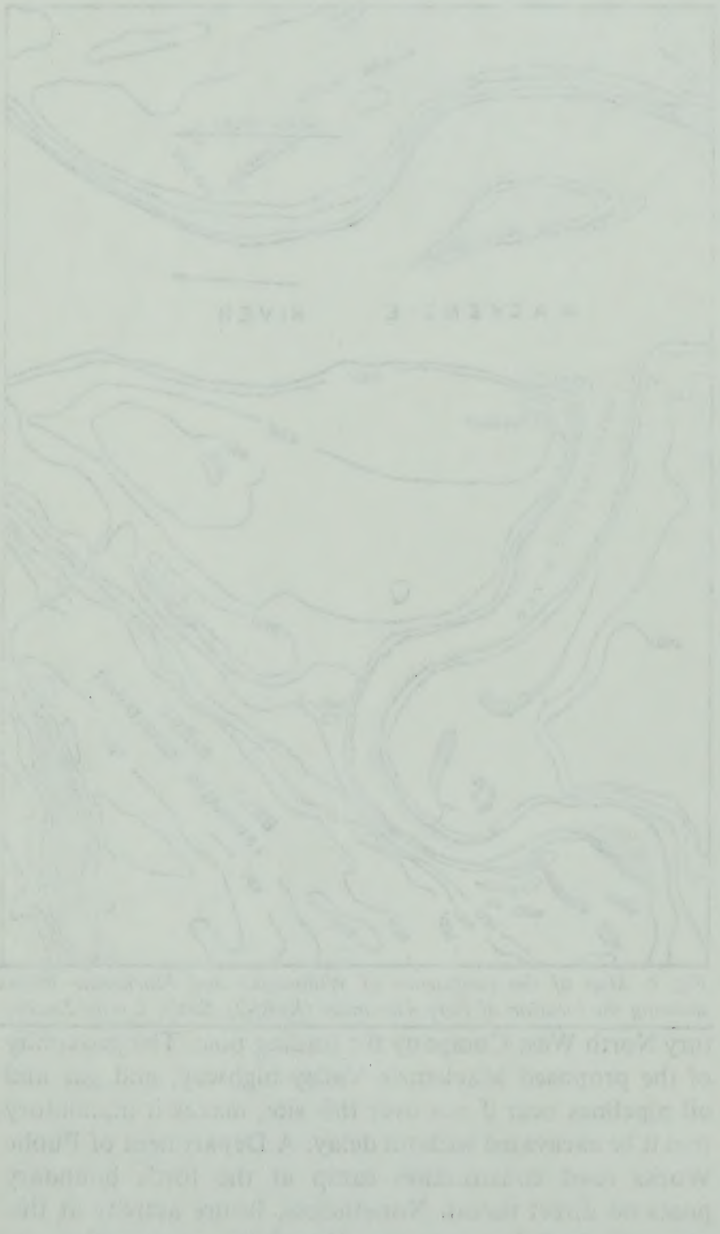

Fig. 2. Map of the confluence of Willowlake and Mackenzie Rivers showing the location of Fort Alexander (KeRj-2). [illegible]

tary North West Company's trading post. The possibility of the proposed Mackenzie Valley highway, and gas and oil pipelines near if not over the site, makes it mandatory that it be excavated without delay. A Department of Public Works road construction camp at the fort's boundary poses no direct threat. Nonetheless, future activity at the area will doubtless increase. Hopefully, construction engineers and archaeologists will collaborate in preserving the first historic fort to be excavated in the Northwest Territories, and that another important portion of Canadiana will not fall to the bulldozer's blade.

Location

Fort Alexander (KeRj-2) is situated 2.5 km upstream from the confluence of the Willowlake and Mackenzie Rivers (Fig. 2), just off the margin of Castor Shoals. The area is hilly with elevation in excess of 150 m away from the rivers, sloping abruptly to sandy and [illegible]

[illegible] Fieldwork

[illegible] 1985 [illegible] Father [illegible] O.M.I. [illegible] Mackenzie and [illegible] Willowlake [illegible] several miles upstream from the [illegible] had been observed by [illegible] years of age) for a period [illegible] of the Northwest Territories [illegible] Fort Alexander [illegible]

[illegible]

Mackenzie Highway

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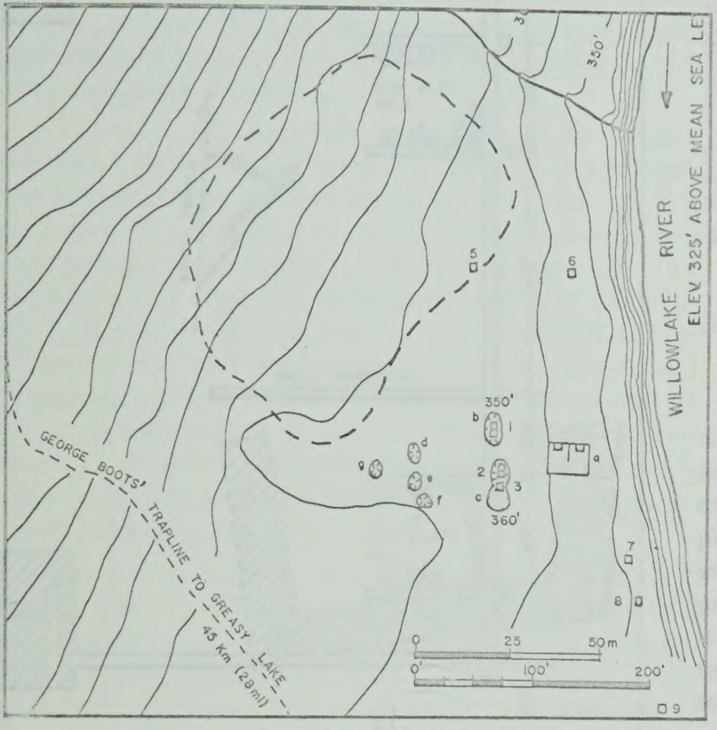
3
350'
WILLOWLAKE RIVER
ELEV 325' ABOVE MEAN SEA LE
5
6
350'
b
1
a
d
g
e
f
2
3
c
360'
7
8
GEORGE BOOTS' TRAPLINE TO GREASY LAKE 45 Km (28 mi)
0
25
50m
0'
100'
200'
9

Fig. 2. Area surrounding Fort Alexander (KeRj-2), Willowlake River, N.W.T. Numbers indicate test pits while letters show site features.

lands adjacent to the Mackenzie River. Willowlake River elevation near Fort Alexander is 100 m. The site proper lies within mixed deciduous and coniferous forest. Poplar invasion of previous spruce forest probably occurred because of extensive woodcutting during the fort's operation.

A Slave Indian settlement located at the confluence of the Willowlake and Mackenzie Rivers contains another archaeological site. In 1967 the livelihood of the dozen or so inhabitants was provided by hunting, fishing and trapping. Good alpine fishing lakes northeast of the area are utilized during trapping season. Presumably, Greasy and Fish Lakes were important fishing lakes to the early historic and prehistoric inhabitants.

Observations on Mounds

Archaeological survey began August 11, 1967 when a collapsed log cabin was observed several hundred meters downstream from the site. Structural deterioration and cabin contents suggested its occupation prior to 1935. On the river bank adjacent to the site several scorched animal bones were found within a thick charcoal band 65 cm below the ground surface. The site itself was located 10-37 meters within the forest from the top of the river bank. It consisted of three mounds covered with dense underbrush and earth (Fig. 2, *feature a* with 2 mounds and *feature c*) and six depressions between 37 and 70 m from the bank (Fig. 2, *features b - g*). The largest mound and depressions were *features c* and *b* respectively. A cluster of four small depressions were found midway between the river bank and Boots' trapline to Greasy Lake (*features d - g*).

Testing was initiated at *feature a* nearest the river because of the possible association of its north and south mounds. Brush and forest floor material were cleared from the south mound nearest the river, revealing a circular conglomeration of river cobbles 10-30 cm in diameter and less than a meter in height. Excavation revealed about three cubic meters of such cobbles with adhering burnt clay (chimney mortar). Deeper situated cobbles were found on the pile's western half with a scattering of rocks fanning outwards towards the east. Rocks on the eastern section of *feature a* overlie a series of burnt parallel logs mixed with scorched earth.

Fireplace Uncovered

Lacking proper surveying equipment a preliminary test trench was dug surrounding *feature a*, allowing proper vertical and horizontal control in the retrieval of data (Fig. 3, fireplace #1). One meter excavation pits were dug from the trench inwards. Troweling showed a concentric succession of cobbles arranged ring-like about the mound's western half, with progressively smaller rocks toward its center. Portions of adhering burnt wood and charcoal with heavy concentrations of strongly oxidized burnt earth were found near the center of the ring. White ash concentrations extended vertically downwards in the hearth center. Four vertical uprights supporting a log crib enclosing the concentric cobbles completed the remains of fireplace #1.

The amorphous distribution of the mounded surface cobbles plus the unburnt log portions underlying them suggested complete collapse of the chimney, presumably when the feature, obviously a cabin, was razed.

All cobbles, fire-cracked rock, burnt wood and clay were situated within the lower humus zone except within the log crib which had been dug below the old ground surface. Old board flooring was found 26-38 cm above the volcanic ash level that pervades the entire region. Five parallel northeast oriented boards were traced towards the wall side or rear of the fireplace. Additional timber and boards running southeast 29 cm above the ash and 15 cm below the humus suggest construction using joists sup-

ackenzie Highway

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consists of a trail network covered with dense undergrowth and trees (Fig. 2, A) [illegible] with 2 mounds and feature c) and six depressions between 37 and 70 m from the bank (Fig. 2, features [illegible]). The largest mound and depressions were features a and b respectively. A cluster of four small depressions were found midway between the river bank and [illegible] trapline to Grassy Lake (features d-g).

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Fireplace Unearthed

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All cobbles, fire-cracked rocks, burnt wood and clay were [illegible] the lower [illegible] zone except within the log crib which had been dug below the old ground surface. [illegible] board flooring was found 20-25 cm above the [illegible] the entire [illegible]. Five parallel [illegible] boards were [illegible] the east side or rear of the fireplace. [illegible] timber and boards running [illegible] 20 cm above the [illegible] 16 cm below the humus suggest construction using joists and

Fig. 2. Site surrounding Fort Alexander [illegible]. Willowlake River [illegible]

lands adjacent to the Mackenzie River. Willowlake River [illegible] near Fort Alexander is 100 m. The site proper lies within mixed deciduous and coniferous forest. Poplar [illegible] of previous spruce forest probably removed for [illegible] or wood-cutting during the [illegible] fort's operation.

A Slave Indian [illegible] located at the confluence of the Willowlake and Mackenzie Rivers contains various archaeological sites. In 1967 the livelihood of the [illegible] inhabitants was provided by hunting, fishing and trapping. Good [illegible] fishing lakes northeast of the area are utilized during trapping season. Presumably Grassy and [illegible] Lakes were important fishing lakes to the early historic and prehistoric inhabitants.

Observations on Mounds

Archaeological survey began August 11, 1967 when a [illegible] log cabin was observed several hundred metres downstream from the site. Structural determinations and cabin contents suggested its occupation prior to 1935. On the river bank adjacent to the site several scorched animal bones were found within a thick charcoal band 65 cm below the ground surface. The site [illegible] was located 100 metres within the forest from the top of the river bank. It

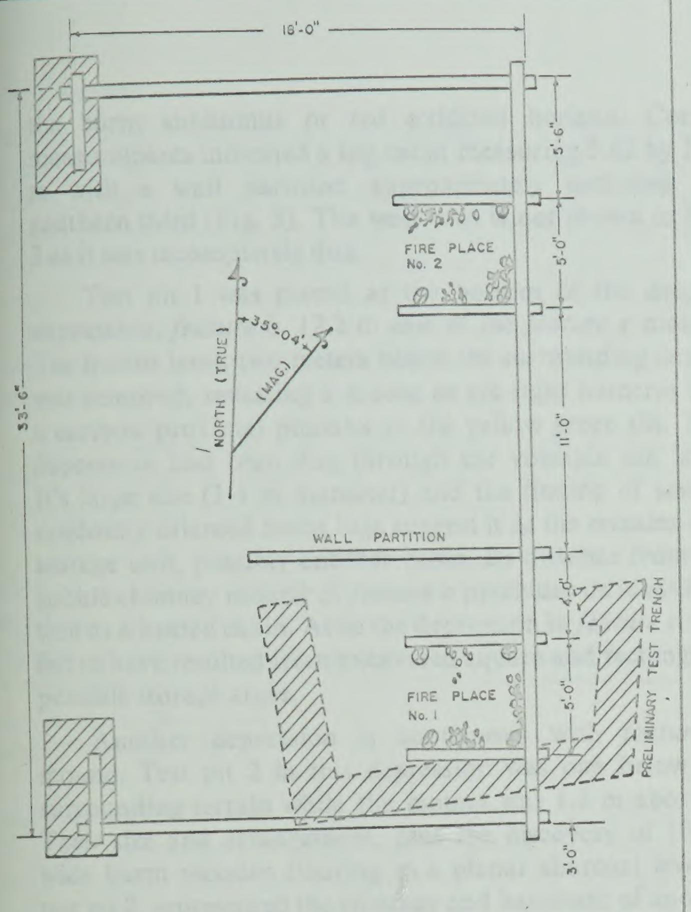

FIG: 3. PLAN VIEW OF FEATURE I, FORT ALEXANDER N.W.T. (KeRj-2)
SHADED AREAS REFER TO EXCAVATED TRENCHES
SCALE = 3/16" = 1'-0"

porting the flooring. Log beams and boards from the walls and floor preserved by the collapsed chimney were found 20-40 cm below the ground surface. Parallel truncated beams immediately to the east of the fireplace were the remains of *feature a*'s east wall. Several of these were approximately 3 m in length, their burnt ends suggesting greater lengths before firing. Some logs and boards had been sawn with a metal blade and were evenly squared.

In the southwest corner of the test trench, two isolated meter-long sawn beams were found at a depth of one meter. Their intrusion through the white ash and their isolation suggest a sub-floor storage area, perhaps for food.

Artifacts Found

In the southwest corner of *feature a* a headless square nail in the fireplace ash was found 20 cm above the volcanic ash level. Close by was situated a hammered iron hinge constructed from a nail and sheet iron straps, presumably for a southwest cabin door. Another nail was found nearer the cribbing.

Initial testing near fireplace No. 1, Feature 1.

Details of Fireplace No. 1 showing wood crib containing river cobble firebox. East Cabin wall to right.

A section of packed fired clay, retaining the curvature of a stovepipe was found southwest of fireplace #1, 25 cm above the volcanic ash level. Below the main wall beams east of the cribbing was found a rusted wrought iron dispatch case fastener three cm above the white ash band. It is smooth on one face with two loops on the reverse side. The preliminary 1967 testing produced very few artifacts and it is suggested that the area had been abandoned prior to razing, with most 19th century goods having been removed.

As wall logs were burnt off south of fireplace #1, the east wall backing the fireplace was traced by stripping the sod and burnt earth. Mud chinking was found between several wall logs. The bottom timber of fireplace #1 was found to continue completely through *feature a.* A log wall or partition was found 1.3 m from fireplace #1 perpendicular to the major wall beams (Fig 3). While several workers were engaged in test pitting the site the remainder of the crew stripped the cover off the second mound of *feature a*, uncovering a second cobble pile identical to the first. Scattered ash and charcoal identified it as a second fireplace with its eastern border on the same heavy beam that underlay the first fireplace, at a distance from the latter of about five meters.

Traces of Cabins

Time and funds prevented complete excavation of fireplace #2 and immediate surrounding area. It was left for future workers as a partial cobble mound. Initial examination showed identical structure to fireplace #1. Less than two meters beyond fireplace #2 a corner of the structure was found where the east and north walls joined. The latter was followed west for almost two meters. Again, burnt log walls were absent outside the cobble pile area due to the heavy firing of the structure, but it was possible to follow the west wall to its southwest corner by examining

[illegible] looking west from fireplace No. 1, Feature A

Detail of Fireplace No. 1 showing wood sill [illegible] two cobble [illegible] wall at right.

A section of packed fired clay, retaining the curvature of a stovepipe was found southeast of fireplace #1, 75 cm above the volcanic ash level. Below the mass wall beams west of the chimney was found a riveted wrought iron [illegible] three cm above the white ash band. It is smooth on one face with two loops on the reverse side. The preliminary 1987 testing produced very few artifacts and it is suggested that the area had been abandoned prior to 1900, with most 19th century goods having been removed.

As wall lines were found off south of fireplace #1, the east wall [illegible] the fireplace was traced by extending the [illegible] south. More [illegible] was found between [illegible]. The [illegible] timber of fireplace #1 was [illegible] completely through feature A. A [illegible] wall of [illegible] was found 1.5 m from fireplace #1 [illegible] to the [illegible] wall [illegible] (Fig. 3). While several [illegible] a test [illegible] the [illegible] of the [illegible] the cover off the [illegible] revealing a second cobble [illegible] identical to the [illegible]. Scattered ash and charcoal identified it as a second fireplace with its eastern border on the same [illegible] that [illegible] the first fireplace, at a distance from the [illegible] about five meters.

Traces of Cabin

Time and supply prevented complete excavation of fireplace #2 and its immediate surrounding area. It was left for later, when [illegible] a partial cobble [illegible] similar examination showed identical structure to fireplace #1. Less than two metres from [illegible] fireplace [illegible] of the structure was found where the east and north walls joined. The latter was followed west for almost two meters. Again, burnt log walls were [illegible] the [illegible] to the [illegible] of the structure, but it was possible to follow the west wall to its southwest corner by examining

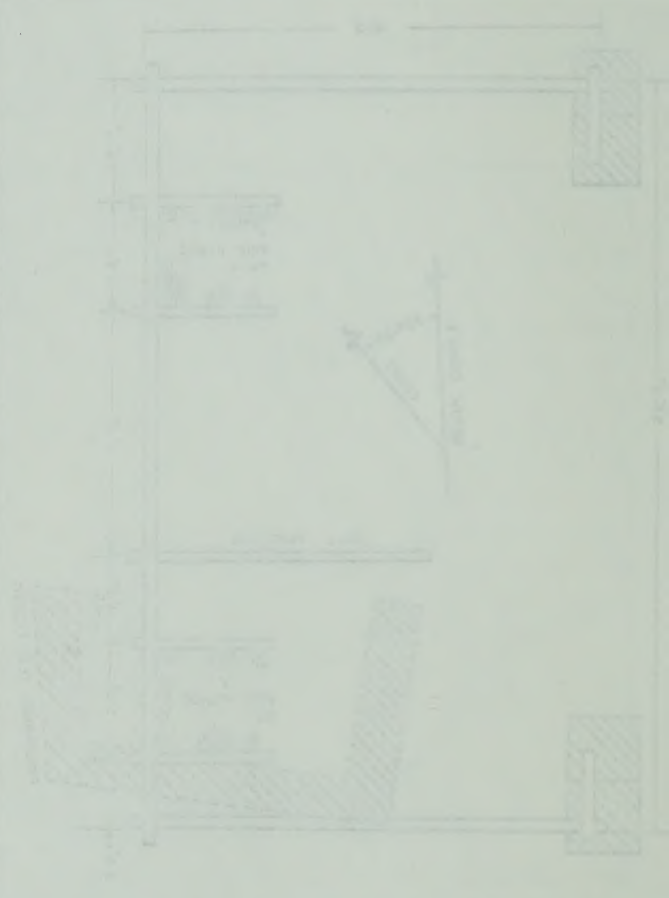

FIG 3. PLAN VIEW OF FEATURE 1, FORT ALEXANDRIA
[illegible] (1987-2)
[illegible]

ing the flooring. Long beams and boards from the wall floor preserved by the collapsed chimney were found [illegible]0 cm below the ground surface. Parallel [illegible] immediately to the east of the fireplace were the remains of feature A's east wall. Several of these were approximately 3 m in length, their burnt ends suggesting longer lengths before burning. Some logs and boards [illegible] sawn with a metal blade and were evenly spaced.

In the southwest corner of the test trench, two [illegible]ated meter-long sawn beams were found at a depth of [illegible] meter. [illegible] through the white ash and their [illegible] suggest a [illegible] or storage area, perhaps for food.

facts Present

In the southwest corner of feature A a [illegible] in the [illegible] ash was found 20 cm above the volcanic level. Close by was situated a hammered [illegible] iron [illegible] from a [illegible] and [illegible] iron straps, presumably [illegible] southwest [illegible] door. Another nail was found near [illegible] building.

the burnt subhumus or red oxidized horizon. Corner measurements indicated a log cabin measuring 5.62 by 12.5 m with a wall partition approximately enclosing the southern third (Fig. 3). The west wall is not shown in Fig. 3 as it was incompletely dug.

Test pit 1 was placed at the bottom of the deepest depression, *feature b,* 17.2 m east of the *feature c* mound. The humus level, two meters below the surrounding terrain was removed, revealing a moose or elk right humerus and a caribou proximal phalanx in the yellow green silt. This depression had been dug through the volcanic ash level. It's large size (3-4 m diameter) and the finding of several randomly oriented burnt logs suggest it as the remains of a storage unit, possibly another cabin. Its distance from the cobble chimney mound of *feature c* precludes its identification as a heated cabin. As in the depression in *feature c*, it is felt to have resulted from excavated square and rectangular possible storage areas.

Another depression is contiguous with *feature c* mound. Test pit 2 in this depression was one below the surrounding terrain while the mound was 1.3 m above it. Their size and arrangement, plus the discovery of 10 cm wide burnt wooden flooring in a planar charcoal level in test pit 2, represented the chimney and basement of another heated cabin, possibly living quarters. The volcanic ash level immediately underlay *feature c* depression. Its mound was cursorily examined through test pit 3, revealing the largest cobble chimney pile at the site.

The westernmost pits, *features d-g*, were mapped but left untouched for later examination. Their small size, the absence of chimney mounds and wooden beams or flooring, and their distance from the river suggested their use as refuse dumps. Further excavation is mandatory.

Pedological examination revealed a sequence of 8 stratigraphic levels within *feature 1* and *6* levels in the various test pits scattered over the immediate area. Common to all profiles progressing in levels from the surface, were 10-20 cm of humus, 3-5 cm of volcanic ash, a red oxidized earth zone and a basal level of yellow or green sand and silt. *Feature 1* profile had another upper red oxidized horizon with cultural remains and a disturbed sandy silt with scattered charcoal immediately overlying the basal yellow sand.

Cultural remains such as chimney cobbles, wood beams and logs, butchered bone and metal artifacts were found primarily in the upper red oxidized horizon. Some wooden beams and bone were taken from the finely banded silt, while two sawn logs possibly part of a cold storage area near the southwest cabin entrance intruded below the volcanic ash level. With the exception of these intrusives, all cultural material from the former fort was found above the volcanic ash level located in the lower portions of the soil profile.

Pedological reconstruction is fraught with possible misinterpretation at this stage of research, but an analysis of geological events can be attempted. The basal level was deposited by silty floodwaters possibly caused by localized ice-damming and spring runoff of the Willowlake River. Forest fires later formed charcoal fragments in addition to scorching the forest floor, producing a black ash and red oxidized horizon over the yellow and green sandy silt. About 750 A.D. the eastern lobe of the White River volcanic ash distribution (Bostock Fig. 1) fell on the lower Willowlake River area. As our 1967 survey extended the ash distribution far beyond Bostock's chart, it remains unknown whether the ash drifted as far east as the Willowlake River headwaters. If it did, the usual torrential rains following volcanic ash fall might have resulted in floodwaters depositing the silt overlying the White River ash horizon. Above this dark silt level in the stratigraphy nearest the river occurred a horizon of finely banded silt, possibly representative of later seasonal flooding.

Bone Fragments Identified

A study of the faunal evidence at Fort Alexander yielded clues regarding butchering patterns, types of animals present 150 years ago and seasonality of the site's occupancy. Bone was found primarily around fireplace #1, although test pits 1 and 6 and fireplace #2 produced small samples. Fireplace #1 bones were considered in detail as they appeared to cluster using excavation data. Two areas produced charred bones of caribou and other antlered ruminants, beaver, unidentified mammals, birds and fish. A heavy concentration occurred outside the east wall of *feature a* and may have represented a fireplace ash disposal area. As it was customary to throw table waste into the fire, bones would ultimately be burnt and discarded with the wood ashes.

Four mammal species were identified. Caribou, moose, beaver and snowshoe rabbit were itemized, but elk and Canada goose may have been present.

Of 192 bones only 17 were positively identified due to the presence of fragmentary and burnt specimens. Of the 17, seven were caribou, two were moose, five were beaver and three were snowshoe rabbit. Less clearly defined specimens included under the "probable" category numbered

(cont'd on page 24)

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grande majorité des cas, sauf au Québec. Le malheur veut aussi qu'il faille corriger, trop souvent, l'original. Un travail systématique de "bilinguisation" a déjà été tenté et accompli dans deux régions importantes, mais à cause de divers facteurs (manque de personnel ou de sources de référence), 75% sont à refaire. Des glossaires sont en voie de publication, des études sur le graphisme et l'emploi de symboles s'effectueront. Le mécanisme trouve enfin sa voie et son rythme, après d'inévitables tâtonnements.

La sensibilisation à ce problème est désormais une phase dépassée et classée. La véritable mise en oeuvre commence et ses manifestations ne tarderont pas.

Bien sûr, le passage définitif du bilinguisme de l'hypothèse à la réalité dépend d'une foule d'autres éléments connexes et, surtout, enjambe les institutions pour rejoindre les individus dans leurs convictions et leurs habitudes. Quant au contenu bilingue des écriteaux, au fur et à mesure de son expansion, il deviendra partie intégrante du paysage, de l'environnement, et de cette façon fera son chemin dans l'esprit des gens. Voilà pourquoi les efforts et le perfectionnisme qui président à la mise au point d'un programme d'implantation d'écriteaux bilingues ne peuvent souffrir de compromis.

Le bilinguisme, la constatation s'impose, est un animal glouton. Il consomme beaucoup (certains diraient trop) de mots, apprêtés à la française ou à l'anglaise, mais il ne dédaigne pas non plus les énergies de bon nombre de fonctionnaires, denrée particulièrement recherchée et parfois d'une rareté inquiétante, selon la saison. Mais ses victimes, si victimes il y a, sont, curieusement, ses principaux bénéficiaires. Comme quoi il ne faut pas toujours se fier aux apparences. ◻

Archeological Discoveries
(cont'd from page 19)

one moose and caribou, 11 antlered ruminants or *cervidae*, 35 large mammals, 115 small mammals and four unspecified mammal bones too destroyed for further identification. Four bird specimens containing gooselike bones and one fish vertebra were recorded. Three bone fragments were unidentifiable. The bone sample was too small for meaningful population and age estimates. While the beaver was immature in lacking its epiphyseal vertebral plate, the caribou was adult.

Bone specimens were modified largely through burning. Twenty were charred, 110 were heavily fired and eight bore cut marks from butchering. The latter's low frequency may be partially due to boiling of complete sections, followed by stripping of the flesh with the fingers. Knife marks were found on four moose or elk leg bones, a large mammal rib and leg bone and a caribou leg bone. A shoulder blade (scapula) of a moose or elk bore irregular holes. The degree of burning, charring to heavy firing, appeared dependent upon location and duration of specimen within the hearth. A moose scapula showed evidence of gnawing, while two caribou leg bones presented indications of bone disease, possibly arthritis.

Although moose, caribou, rabbit and possibly elk were normal annual residents they were usually hunted in the autumn and winter. Some were killed in summer at the fishing lakes, but meat preservation, accessibility and transport of carcasses by dog teams and general winter hunting location suggest that these animals found at the settlement were taken in winter through meat hunting and related trapping activities. The immature beaver specimen and fish vertebra and the probable goose leg bone suggest open water conditions at the site. While the former may be an adjunct to early winter trapping, the latter may have been taken around freeze-up. In sum, too little evidence exists to ascertain definite winter seasonality.

Conclusion

Field data show the location of several tons of river cobbles as three fireplaces, five depressions indicative of basements and refuse pits, at least three cabins, and an inventory of several dozen artifacts and almost 200 bones taken from the red oxidized cultural level underlying the humus of the site. Cabins were interred through the forest mat, with floors and joists resting on the banded silt. Several places bore evidence of cultural material intrusive through the White River ash level. The size and arrangement of settlement structures suggest something in the magnitude of a fur-trading fort. Emphasis upon large multiple fireplaces and hunted animals suggest winter occupation.

Historical data

The first reference to a Willowlake River fort occurred in 1821 in a map drawn by Hudson Bay Company historian Wentzel and accompanying letter compiled at Winter Lake during Sir John Franklin's barrenland expedition. He placed a fort on the south rather than the north bank at the confluence of the Willowlake and

Mackenzie Rivers and called it "Willow Lake river" post or "Old Fort Alexander", a dual name that was not unusual in the literature of the time. Simpson, writing in 1821 for the Hudson's Bay Company confused Wentzel's description by stating that "They (N.W. Company) have an other Post at Willow River near Bears Lake River . . . ". An edited footnote by E.E. Rich in 1938 mentioned that this was Fort Alexander situated five hours travel down the Mackenzie River from the Willowlake River. As Wentzel was on the Mackenzie River during Fort Alexander's occupancy Holland trusts Wentzel's description, a conclusion to which I concur.

Historian J.K. Stager placed Fort Alexander rightfully on the north bank but credited it with the date of 1804, a decade earlier than Cooke and Holland's more accurate estimate based upon Wentzel's description. Their description suggests Fort Alexander.

> *. . . was apparently built for the North West Company in 1817, possibly by Charles Grant, who made a trading journey down Mackenzie River in 1817 and was the only European known to have been on the river that year . . . it was apparently abandoned in favour of Fort of the Forts (i.e. Fort Simpson in 1821) . . .*

Stager presented another cross-current of information when he stated Fort Alexander of Wentzel's map was possibly an X.Y. Company post during the period of intense rivalry between this fledgling company and the North West Company, but this seems wrong in view of Rich's research. Rich gave the following:

> *The North West Coy. have changed their posts repeatedly in this District, on account of the difficulty in procuring sustenance; there is more danger to be apprehended from starvation here than in any other part of North America, and unless the greatest precaution is taken the people must inevitably perish.*
>
> *The North West Coy. have at present three posts (i.e. Forts Alexander, Good Hope and Liard) in the District which produce from eighty to one hundred packs valuable Furs but the Trade thereof is more heavy and inconvenient than in any other part of the Country where they are unopposed on account of the delay in bringing their returns to Market.*

Summer absence of Fort Alexander staff appears confirmed in a brief description of it as a wintering North West Company post at the mouth of the Willowlake River, Circa 1817-1821. ◻

Text References

BOSTOCK, H.S. (1952) Geology of northwest Shakwak Valley, Y.T. . **Geological Survey of Canada Memoir 267**, Ottawa.

COOKE, A. and C. HOLLAND (1971) Chronological list of expeditions and historical events in northern Canada: 1790-1821. **The Polar Record**, Vol. 15, No. 99, pp. 893-920.

HALL, R.E. and K.R. KELSON (1959) The Mammals of North America, Vol 1, Ronald Press Company, New York.

HOLLAND, Clive (1973) Personal Communication January 17, 1973. Scott Polar Research Institute, Cambridge University.

MACNEISH, R.S. (1951) An archaeological reconnaissance in the Northwest Territories. **National Museum of Canada, Anthropological Report.** Bulletin 123:24-41, Ottawa.

RICH, E.E. ed. (1938) "Simpson's Athabasca Journal", in **Hudson Bay Record Society Series**, Vol. 1:394-5.

RUTTER, N. (1973) Personal Communication. Institute of Sedimentery Petrology. Geological Survey of Canada, Calgary.

STAGER, J.K. (1968) Fur trading posts in the Mackenzie Region up to 1850. Department of Geography, University of British Columbia.

WENTZEL F. (1822) **Memoirs of the Wernerian Natural History Society of Edinburgh**, Vol. 4, 1821-1822; p. 562-3.

Detailed appendices are available from the author in Ottawa.

Bldg Energy Systems
(cont'd from page 21)

more, a large part of our air pollution is linearly related to the energy consumed. A real energy shortage on this continent might suddenly produce rationing legislation. This could be in the form of a limit on the number of BTU's per square foot any building owner is allowed to consume. Modifying existing systems to meet such a ration will be very expensive. Surprisingly, better design of new building systems will probably reduce, rather than increase, capital expenditures and energy costs.

Cutting the peaks off our 24-hour cycling loads and filling in the valleys (improving the load factor) results in smaller sized equipment. These savings in capital expenditure may in some cases be greater than the energy savings over the entire life of the building.

The challenge to reduce waste and pollution lies squarely on the shoulders of the engineering profession. Our science is economically dictated but the economics are changing and we must prepare ourselves now to meet the future shock. ◻

ALONG THE MACKENZI

The Mackenzie Highway, a multi-million dollar operation, is one of Public Works' most important projects. A Western Region responsibility, the project's manager is Frank Kimball of the region's Edmonton office.

Much of the public discussion surrounding construction of the Mackenzie has centered on the highway's impact on the environment. In May, G.D. Reid, Assistant Director, Resources (Civil) of the Design and Construction branch at Headquarters presented a paper dealing in great detail with the subject.

Entitled "The Impact of the Northern Environment on Highway Construction", it was presented at a conference in Ottawa on Construction in Canada's North. The Canadian section of the American Association of Cost Engineers sponsored the learned gathering.

The following are excerpts from Mr. Reid's paper:

Background

The Mackenzie Highway is a vast project and when completed will extend 1,050 miles from the Alberta — Northwest Territories Boundary to Tuktoyaktuk on the Beaufort Sea. This is a length similar to that of the Trans-Canada Highway across the three prairie provinces.

The Department of Public Works is acting as the design and construction agency for the project on behalf of the Department of Indian Affairs and Northern Development. After completion of the highway the Government of the Northern Territories will assume responsibility for the maintenance, operation and roadside development.

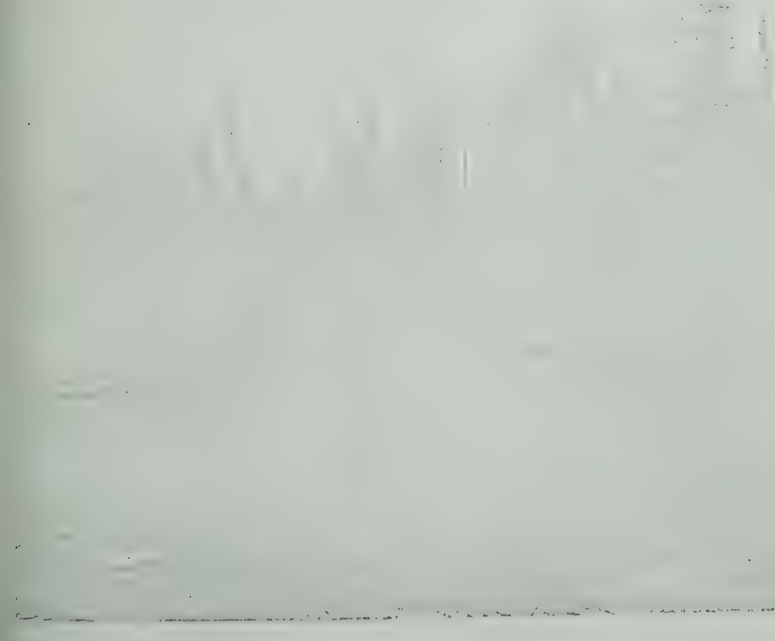
The Department of Public Works has been working on the first 300 miles of the highway from the Alberta-Northwest Territories Boundary for some time and since 1971 has been working in the area immediately south of Inuvik.

The purpose of the highway is to provide a land communication link to northern communities and to facilitate northern development. With the discovery of oil and gas in the north and with proposals for pipelines to market these resources anticipated, the construction of the highway was accelerated to support development and construction of these facilities.

Major Components

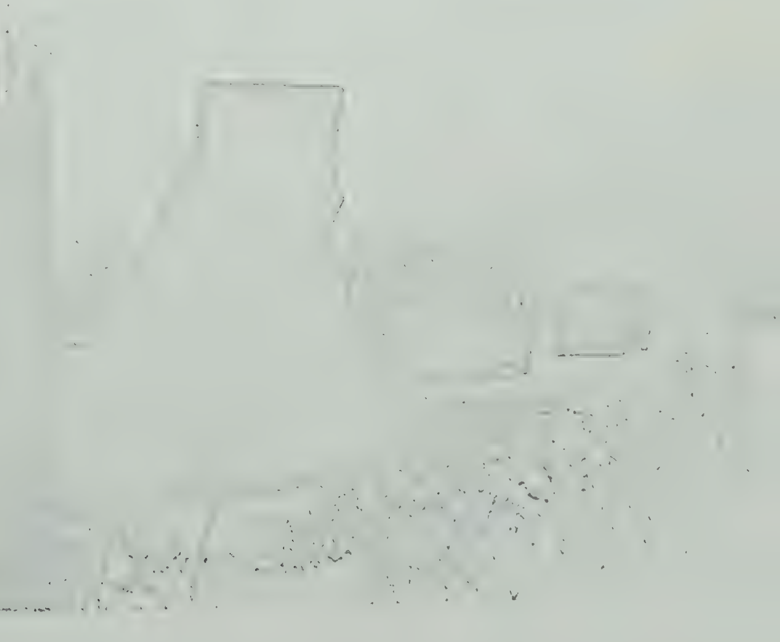
The standards of construction call for a 32-foot wide gravel surfaced highway having a design speed of 60 mph.

The proposed construction will require about 50 bridges totaling over 12,000-feet in length and two or three ferries. When the highway is completed we expect that over 50,000,000 cubic yards of material will have been moved involving 120,000,000 cubic yard-miles of haul. Requirements for gravel are expected to exceed 3,500,000 tons and 20,000,000 ton-miles of haul. About 10.000 acres of clearing is anticipated. . . .



Clearing preparation prior to construction of subgrade.

Déblaiement précédant la construction de la plate-forme de voie.



Building the subgrade. Only in winter months can trucks drive on the frozen clear path.

Construction de la plate-forme de voie. Les camions ne peuvent circuler sur l chemins débalyés que pendant les mois d'hiver.

HIGHWAY

Environment-Highway Interaction
by G.D. Reid

During this peak period (of construction), we expect that over 1,000 persons will be involved in construction, design, supervision and monitoring of the highway. . . .

Current Status

At the present time, the highway has been completed to Fort Simpson at Mile 297 and is under construction from Fort Simpson to Camsell Bend at Mile 346. Also under contract are 73 miles between Inuvik and Arctic Red River. The remainder of the route between Camsell Bend and Arctic Red River and from Inuvik to Tuktoyaktuk is under detailed study and/or design. . . .

The Problem and Its Solution

The department has recognized the importance of the environment/highway interaction and has assembled a multi-disciplinary team consisting of both our own staff and consultants to identify, consider and solve the many complex problems involved. A major component of the department's team are three firms of environmental consultants who have been retained with the primary objective of minimizing the ecological effects of the highway's development within the Mackenzie Valley. The consultants have been asked to conduct environmental surveys and studies along proposed highway routes for the primary purpose of assessing environmental impact and in particular to identify critical land of sensitive areas. They have also been asked to identify and assess inherent visual resources such as views, vistas, overlooks and other landscape features as well as to identify and assess areas as to their potential recreational capability.

In carrying out their studies, they will be considering the optimization of route location from an environmental damage, ways of remedying environmental damage, means of enhancing environmental values. . . .

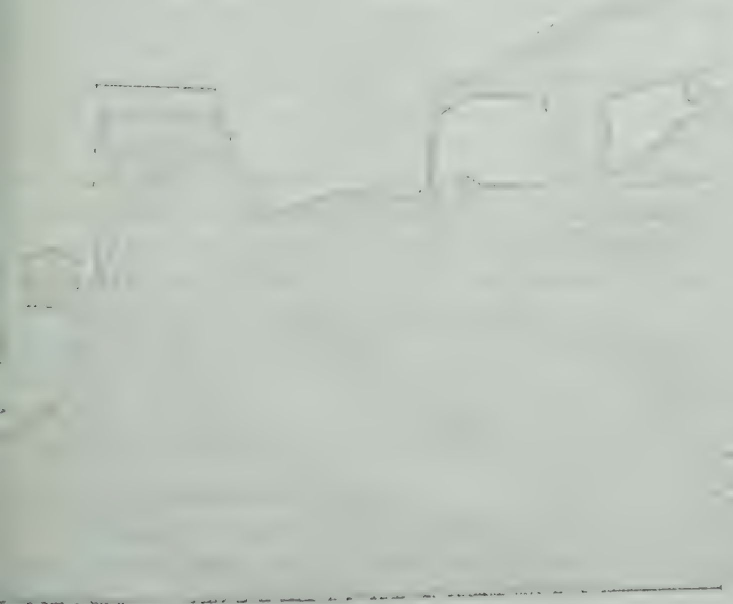
Arrangements are also being made for the identification, preservation or salvage of historic or archaeological sites and close liaison has been established with the National Historic Sites Branch and the National Museum of Man to ensure that all necessary measures are undertaken. The consultants' work will not be finished with the completion of the design as they have also been asked to monitor environmental side effects during construction and report their findings including recommendations as to remedial measures. . . .

In conducting their studies, subjects of main concern are: wildlife protection, terrain stability, aesthetics, visual resources, watershed and stream pollution, air pollution, the preservation or restoration of vegetation, fish migration and spawning, native hunting and trapping, preservation of unique land forms and geological features.

While the sociological impact of the highway's construction and operation are not ultimately the responsi-

Dumping gravel and shaping the roadbed.

Le déchargement du gravier et la formation de la couche de base.



A Nodwell used for transportation once the right of way has been cleared.

Un Nodwell sert de transport dès que la circulation est possible.

bility of the Department of Public Works, we are most conscious of our role in helping to realize the objective of striking an optimum balance between maximization of benefits and minimization of effects on the traditional society of northern native communities. Areas where appropriate action is being taken include the training and employment of native northerners; a route location which provides close access but avoids undue infringement on existing communities; the assurance that traditional traplines and hunting and fishing areas are preserved; the location of construction camps and staging areas to avoid infringement on communities; the development of roadside campgrounds and parks.

Geotechnical Studies

The department is also carrying out extensive geotechnical surveys. . . . The major thrust to date was made over the past winter when four firms of consultants drilled approximately 6,000 test holes between Camsell Bend and Fort Good Hope.

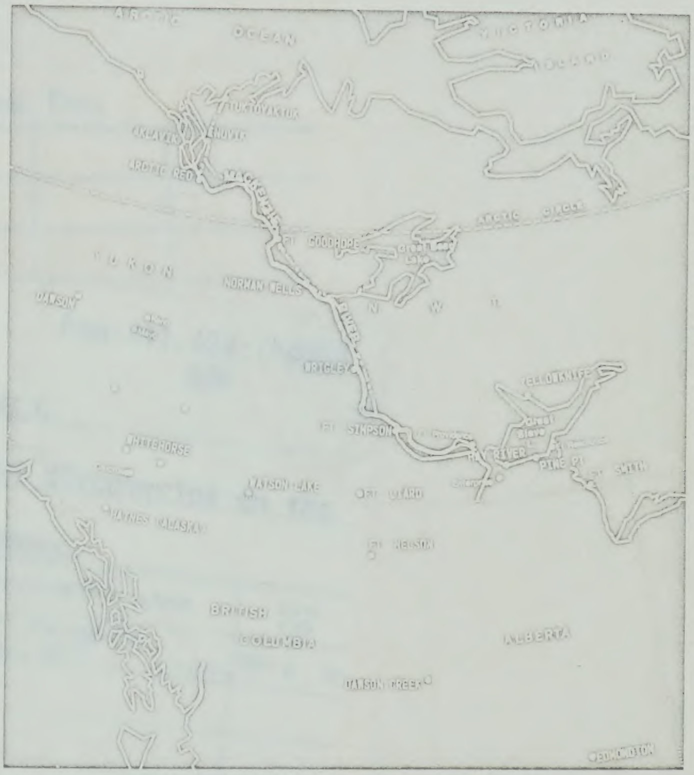
The geotechnical studies are being carried out to delineate soil types and conditions through soil surveys, air photo interpretation mapping, soil sampling and testing as required to determine suitable materials for use in grading and bridging operations. . . .

Hydrological Studies

Hydrological data suitable for the design of culverts and bridges requires records over many years, which unfortunately are not available for the Mackenzie Valley. Nevertheless our hydrology consultants have developed drainage design criteria for us based on the best information available. . . . Further studies are underway now. . . . The problem of drainage design is further complicated by the fact that our culverts or bridges must not only provide a safe design from an engineering point of view, but must also meet the requirements of the Department of the Environment with respect to maximum permissable velocities for fish migration . . . great emphasis must be placed on designs which eliminate or reduce to tolerable levels erosion or deposition of stream bed materials. In addition detailed studies are now underway at the Canada Centre for Inland Waters at Burlington, Ontario, on the design and testing of baffles for culverts which will be required in some streams to ensure the safe passage of migrating fish.

Design and Construction Strategy

Undoubtedly the major engineering concern in designing and constructing the Mackenzie Highway are the problems associated with permafrost. . . .



This map shows the route the highway will take from the Alberta border along the Mackenzie River to Tuktoyaktuk.

The basic principle that is followed in the highway location and design is to avoid excavation in permafrost wherever and whenever possible. If, however, excavation into permafrost must be considered then the following basic principles are being, or will be used:

— where the materials in question are stable during and after thaw, the excavation would be carried out using a convention sloping technique. . . .

— the use of vertical backslopes will be considered in areas of unstable soils, generally where there is a good insulating vegetative cover on the terrain. . . .

— in areas of unstable soils where vertical cuts are undesirable for reasons such as quality of vegetative cover, sloping backslopes would be employed with the slopes and ditch bottoms being blanketed for the purpose of insulation and/or containment as well as protection against erosion. . .

— the subgrade itself in the cut would be sub-excavated and backfilled with stable free draining granular materials to provide an insulating cover for the frozen materials underneath as well as providing a structurally acceptable road grade. ◻

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